

# The Public's Health

Vol. 4, No. 1

*Forensic Science: the application of science to criminal justice*

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## Behind the Scenes in the HEALTH Laboratories

*Forensic scientist Gino Rebussini examining drug evidence delivered by police in the evidence receiving unit. The Forensic Section of the HEALTH Laboratories provides consultation and expert testimony to every police department in Rhode Island.*



### HEALTH Laboratories: Core Functions

The health of individuals begins with a safe and healthy community in a safe and healthy environment. The RI HEALTH Laboratories provides services to ensure the health of RI citizens through its eleven core functions. The information that is generated serves the needs of epidemiologists, regulators, policy makers, the medical community, law enforcement, and the public, the ultimate beneficiary. The RI HEALTH Laboratories is an essential component of the State and National public health infrastructure and clearly operates with a different mission and purpose than do private sector laboratories.

- Environmental Testing
- Providing Science in the Service of Justice
- Identification of Disease Outbreaks
- Reference Services
- Specialized Testing for Diseases of Public Health Importance
- Testing for the Indigent
- Population Screening
- Emergency Response
- National Surveillance Link
- Laboratory Improvement (Statewide)
- Applied Research

Gregory V. Hayes, Dr PH  
Associate Director of Health  
HEALTH Laboratories

### This is what we do...

- In 1995, the raccoon rabies epidemic that had been raging on the East Coast for the previous 15 years finally hits Rhode Island. That summer the HEALTH Lab tests more than 1,100 animals.
- August 1999 proves to be an historic moment for New York City and the entire North American continent. The chief pathologist of the Bronx Zoo notes a massive crow die-off near the zoo. The CDC identifies the cause as the West Nile Virus. A massive response by health officials throughout the region ensues.
- A young woman is found beaten and unconscious on the streets of her city. She is taken to the emergency room of Memorial Hospital, where her wounds are treated and a sample of semen is taken from her body.

Welcome to the world of the Rhode Island HEALTH Laboratories in the Charles V. Chapin Building at 50 Orms St., Providence. This is the sometimes unknown half of the Health Department. In this and future issues of "The Public's Health" we take a closer look at what goes on in this singular domain of skilled scientists and their sophisticated technology.

### Inside the Labs: Forensic Sciences

An important role for the Health Department is that of crime detection. This is the mission and the expertise of the Forensic Sciences Section (aka "Forensics") in the Department's Division of Laboratories.

Crime scenes, especially in violent crimes, contain many kinds of evidence, each with clues that can help determine what happened and who committed the crime. The police gather and preserve this evidence. The Forensic Sciences Section examines and analyzes the evidence to learn as much as possible about the crime and its perpetrators.

Forensics was established in 1938. It occupies over 7,000 square feet of laboratory space within the Chapin Building. It has a staff of 15 forensic scientists and uses cutting edge scientific instrumentation to examine evidence in medico-legal and criminal cases for state and local police departments, the Office of the Attorney General, the Office of the State Medical Examiner, and other law enforcement and regulatory agencies. Forensics delivers prompt, accurate and thorough responses to all requests for services in assisting the criminal justice community. It applies scientific

*Forensic Science, continued on p. 3*

## Inside the Labs: Biological Sciences Section

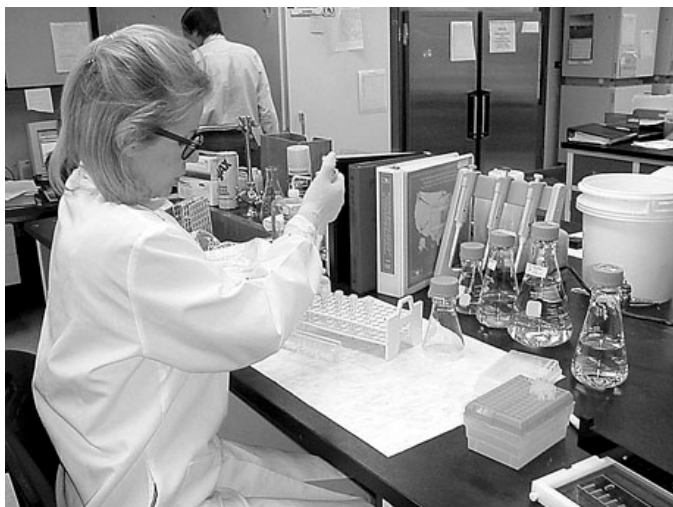
The Biological Sciences Section provides quality laboratory support to programs concerned with improving and protecting public health and protecting the consumer. The Section consists of four separate laboratories: Bacteriology, Serology, Food and Water Microbiology (Sanitary Microbiology) and Biochemistry.

**The Bacteriology Laboratory** tests for traditional communicable diseases and new and emergent viral, bacterial, and parasitic diseases such as cyclospora, E. coli O157, meningitis, multiple-drug resistant tuberculosis, and rabies. The laboratory also monitors enteric diseases such as salmonellosis and sexually transmitted diseases, to assist epidemiologists in controlling the spread of disease in our communities. The laboratory conducts nucleic acid analysis of pathogenic microorganisms to determine "fingerprint" patterns in support of national and local infectious disease surveillance programs, and performs microbiological tests on specimens submitted by the Office of the Medical Examiner. Through funding provided by the National Centers for Disease Control (CDC), the laboratory recently developed capacity to test for suspected bacterial agents of bioterrorism.

**The Serology Laboratory** tests for the serological diagnosis of infectious diseases, such as new and emergent viral, bacterial, and parasitic diseases (West Nile Virus, Lyme Disease, Hanta Virus, and HIV). The laboratory also monitors specimens for pertussis, measles, rubella, sexually transmitted diseases, salmonellosis, and other enteric diseases to help control the spread of disease in our communities. The laboratory also tests cattle and poultry blood specimens to help the Department of Environmental Management (DEM) prevent the spread of infectious diseases in livestock and potentially to man.

**The Food and Water Microbiology Laboratory** monitors the quality of the environment and protects the consumer. Specific tests include microbiological analyses on water and food samples (to assess environmental hazards and food safety);

*Biological Sciences, continued on last page*



*Medical Technologist Deanna Simmons prepares to analyze samples in the Diagnostic Microbiology Section.*



*Celebrating Minority Health Month are Dr. Allan S. Noonan, U. S. Department of Health and Human Services, HEALTH Director Nolan, and Henry V. Johnson, Jr., Chair, HEALTH Minority Health Advisory Committee. Dr. Noonan was guest speaker at an Oct. 26 forum, during which he traced national efforts toward understanding and improving minority health.*

## Inside the Labs: Environmental Chemistry Section

The Environmental Chemistry Section of the Rhode Island HEALTH Laboratories tests the water that we drink, the food that we eat, and the air that we breathe. Testing provides early detection of environmental contaminants. Some chemical contaminants can adversely affect our health even in relatively low concentrations. This depends on the chemical, its concentration, the length

■ The Chapin Building is home to both the HEALTH Laboratories and the Office of the State Medical Examiner. Gregory V. Hayes, Dr PH, is Associate Director of Health (Laboratories). Elizabeth Laposata, MD is the State Medical Examiner. ■

of exposure and the sensitivity of the individual to that substance. State-of-the-art equipment in the hands of highly skilled analysts, coupled with a rigorous quality assurance program, ensure that laboratory results of known data quality are reported to health care providers and state agencies in a timely manner.

**The Air Pollution Laboratory** measures pollutants in outdoor air at sixteen locations throughout the State. These pollutants include sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), carbon monoxide (CO), some 70 different volatile organic compounds, 31 toxic compounds and two different size categories of airborne particulate matter (PM-10 and PM-2.5). All of the data go to the Environmental Protection Agency to develop air pollution control measures. Recently, the EPA chose the laboratory to monitor 90 toxic organic compounds and eight metal species at five sites in the Providence area. The results of this study will be used to develop standards nationally.

**The Environmental Lead Laboratory** analyzes environmental samples (soil, dust, water, and paint chips) from homes with a lead-poisoned child. As a result, the source(s) of childhood lead poisoning can be rapidly identified so that prompt follow up action can be taken by HEALTH's Lead Program.

*Continued on next page*



*Maurice Lynch performing blood lead analyses in the Biochemistry Lab*

**The Food Chemistry Laboratory** performs quantitative and qualitative tests of foods by physical, chemical and instrumental analysis. Areas of focus include dairy chemistry, seafood decomposition and related toxins, extraneous materials identification, elemental analysis, nutritional labeling components, and food illness/consumer complaints.

**The Pesticides Laboratory** analyzes drinking water, wastewater and non-potable water for pesticides and synthetic organic chemicals. This laboratory also detects the excessive or non-approved application of pesticides in support of the DEM's Use/Misuse Program.

**The Trace Organics and Radiation Laboratory** analyzes drinking water, wastewater and non-potable water for organic and radiological contaminants — such as during the January 1996 North Cape oil spill. The laboratory offers radon analytical services and checks for methyl-tertiary butyl-ether (MTBE), a volatile organic chemical, in drinking water due to leaking gasoline storage tanks.

**The Water Chemistry Laboratory** analyzes inorganic materials (e.g. heavy metals) in drinking water, wastewater and non-potable water samples utilizing EPA approved methods.

**The Quality Assurance and Laboratory Licensure/Certification Office** ensures quality of laboratory services at the HEALTH Laboratories Environmental section and in private and municipal laboratories licensed by the state (RI General Laws 16-13.2 - Laboratories). Quality assurance programs assess technical qualifications of personnel, use of acceptable methodology, proficiency testing, and conduct on-site inspections.

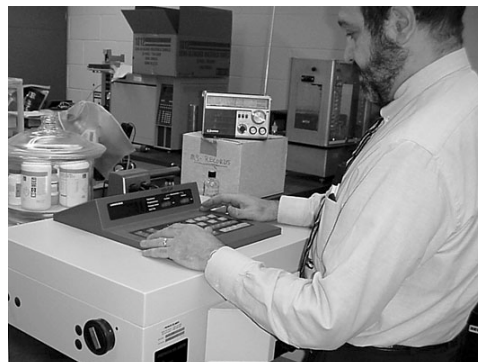
*by Jim Sullivan, PhD,  
Chief, Environmental Chemistry*

## *Forensics, continued from p. 1*

ic principles to crime detection and presents expert opinion, consultation and sworn testimony.

Forensics consists of several specialty units to examine evidence and to train subject-matter experts:

**Forensic Biology/DNA** focuses on sexual assault and other violent crimes, DNA profiling, and suspect individualization and identification. Evidence analyzed includes blood, semen, saliva, urine, other body fluids and tissues, stains, sexual assault evidence collection kits, clothing, bedding, etc. The Laboratory provides evidence collection kits to hospital emergency rooms for individuals reporting rape. Victims do not have to file a police report in order for evidence to be collected. Sexual assault testing is confidential. There is no statute of limitation on the reporting of rape. Forensic Biology/DNA provides definitive evidence to close murder cases, even some unsolvable for many years.



*Forensic Toxicology's Gino Rebussini analyzing confiscated drugs in the Drug Lab*

**Forensic Toxicology** focuses on autopsy specimens, drug and poison analysis, driving under the influence of alcohol, driving under the influence of drugs, and drug abuse in sports. Evidence analyzed includes blood, urine, other body fluids and tissues, and alcoholic beverages. This specialty area concentrates on determining cause of death when alcohol or drugs are a suspected factor.

**Forensic Drug Chemistry** handles controlled substance identification, drug assays, product tampering, and clandestine drug manufacturing laboratories. Evidence analyzed includes pills, powders, potions, drug residue, syringes, drug paraphernalia, pharmaceuticals, and botanicals. Forensics serves *all* police departments in the investigation of the misuse of controlled substances and the use of illegal substances. It produces confirmation of illegal drug use and drug trafficking more than 5000 times each year.

**Breath Alcohol Testing** specializes in the procedures for testing and the training and certification of police officers in those procedures. Forensics maintains the statewide Breathalyzer Certification Program for Police Officers. Staff give on-site training to officers in using the Breathalyzer. Staff also conduct courses in Drug Recognition (DRE), Standardized Field Sobriety Training (SFST), and certify breath-testing instruments.



*An automated analyzer in the Forensic Toxicology Lab used for "stat" analysis of autopsy specimens*

**Support Services** include evidence storage, technical assistance on evidence collection and preservation methods, liaison with FBI laboratories, and work with the FBI and other federal agencies on disasters such as airplane crashes.

The Forensic Sciences Section partners with law enforcement agencies to make its own unique contribution to "safe and healthy lives in safe and healthy communities." It truly practices **science in the service of justice**.

*by David Uliss, PhD, Chief, Forensic Laboratory*



*Biological Sciences, continued from page 2*

environmental tests to locate and evaluate sources and spread of pollution; and bioassays on shellfish to monitor marine waters for red tide toxin – the cause of paralytic shellfish poisoning. The laboratory provides analytical services that assist epidemiologists in determining the source and cause of water and foodborne diseases outbreaks.

**The Biochemistry Laboratory** analyzes blood specimens from children for lead in support of the Rhode Island Childhood Lead Poisoning Prevention Program. About 30,000 blood specimens (fingerstick and venous) collected from children ages nine months to six years by health care providers are analyzed each year.

*by Ken Joness, PhD, Chief, Biological Sciences*

## West Nile Virus

West Nile Virus (WNV) first appeared in New York City last year and spread to many neighboring states, including Rhode Island, during the summer of 2000. CDC funded the Rhode Island HEALTH Laboratories to establish testing to identify West Nile Virus in humans. The RI West Nile prevention program, which includes collaboration between HEALTH, DEM and URI, seeks to reduce the risk of West Nile Virus transmission and spread in Rhode Island. The project involved special training and collaborative efforts with other state and federal agencies.

Wild birds act as “sentinels” to detect the presence of the virus in nature. The American crow and blue jay are most susceptible to the virus. The HEALTH Laboratories accepts dead birds submitted by DEM, and autopsies them in preparation for analysis. The virology laboratory at the University of Rhode Island performs virus isolations and PCR. As of November 16, 2000, 87 of the 352 birds tested were found to be infected with West Nile virus and 4 with EEE virus.



*A robotic instrument used to analyze autopsy specimens*

### And there's more...

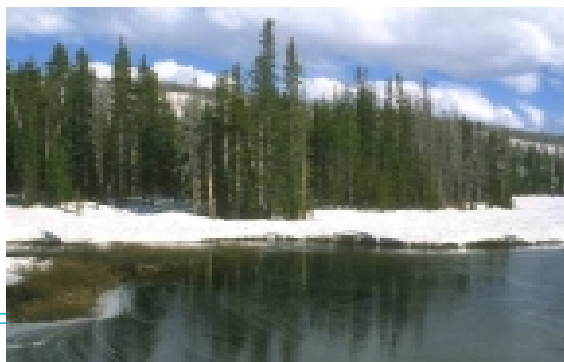
Look to future issues of *The Public's Health* to learn about Diagnostic Microbiology, Sanitary Microbiology, the Medical Examiner's Office, and the rest of the HEALTH Laboratory that we didn't have room for here.



*Surgeon General Dr. David Satcher presents the "Blueprint for Action on Breastfeeding," a national action plan to promote breastfeeding, at the Roger Williams Park Casino on Oct. 30. Dr. Satcher and Health Director Dr. Patricia Nolan recognized South County Hospital as the first hospital in Rhode Island to be designated as "Baby Friendly" by the World Health Organization, for its leadership and commitment to breastfeeding mothers.*



*Paul Iwuc performing blood alcohol analyses*



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